

Development of High Quality University Web Sites

Benefits to Users and the Learning Organisation

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Abstract

In recent years, the online delivery of educational material has received much attention by researchers. University web sites are being used to supplement the delivery of knowledge in traditional bricks and mortar environments or as stand-alone external courses. The function of a university web site also has broader applications that can provide strategic benefits to the organisation as a whole.

An Internet presence based on a high quality, easy to use web site can provide universities with a credible, professional image. This is particularly important as students and other users of university web sites expect the same high level of quality in these sites as they do from the sites of commercial organisations.

This paper explores the various roles that a web site can provide to benefit higher education organisations and their customers. In addition, the paper outlines the results of a study of university web site users that identifies specific web site design features that are considered essential for a high quality university site that will meet the needs of students and other stakeholders in a university environment.

By adopting these design principles, universities will be able to improve the quality of their web sites and ultimately, increase user satisfaction. Moreover, an understanding of the various roles that a web site can perform will allow universities to fully utilise the benefits of developing and maintaining an online presence while retaining their traditional role as knowledge managers

Keywords: University web sites, Non-profit web sites, Web site quality, Web site users study

Introduction

In recent years, the online delivery of educational material has received much attention by researchers. University web sites are being used to supplement the delivery of knowledge in traditional bricks and mortar environments or as stand-alone external courses.

The function of a university web site also has broader applications that can provide strategic benefits to the organisation as a whole. An Internet presence based on a high quality, easy to use web site can provide universities with a credible, professional image. This is particularly important as students and other users of university web sites expect the same high level of quality in these sites as they do from the sites of commercial organisations.

Research to date has focused on two aspects of web site design aimed at achieving user satisfaction through the provision of a high quality site:

- Technical aspects of creating a usable site from the perspective of a professional developer or computer systems expert, and
- Specific design elements that lead to an easy to use, high quality site from the perspective of the user and casual, non-professional web site designers.

The second aspect, with its emphasis on user needs, is the main focus of this paper.

The purpose of this paper is to explore the various roles that a university web site can perform, to identify design elements that are essential for a high quality university web site, and to contribute to the current literature on web site issues by focusing on higher education organisations.

Literature Review

There has been much interest in the application of the Internet as a business tool. Schubert and Selz sum up this revolutionary medium thus:

The Internet could be, at least from a technological point of view, the closest approximation towards a perfect, frictionless market. It offers ubiquitous information which enables buyers to compare the offerings of vendors worldwide (Schubert & Selz 1999:2).

Indeed, the unique characteristics of the Internet and the advantages of maintaining an online presence are well documented. Table 1 is a summary of some of the main Internet characteristics that offer advantages over traditional forms of communication.



Table 1

Summary of Internet Characteristics

Internet Characteristics	References
24 hour access	Ju-Pak (1999), in Dann et al. (2001); Educational Media Australia (2001); Brady (1997); Schubert & Selz (1999).
Global access and independence of location	Ju-Pak (1999), in Dann et al. (2001); McDonald & Wilson (1999), in Chaffey et al. (2003); Schubert & Selz (1999).
Can update information quickly	Sweeney (2000); Educational Media Australia (2001); Waite & Harrison (2002).
Reduction in publishing and printing costs	Dann et al. (2001); Brady (1997); Educational Media Australia (2001); Chaffey et al. (2003).
Interaction between web site and consumer/visitor	Dann et al. (2001); Ju-Pak (1999), in Dann et al. (2001); Sweeney (2000); Educational Media Australia (2001).
A high intensity medium where users will be 100% attentive while viewing	McDonald & Wilson (1999), in Chaffey et al. (2003).
Depth of information can be presented in a multi-media format	Ju-Pak (1999), in Dann et al. (2001); Sweeney (2000); Schubert & Selz (1999).
Medium driven by the user's interest	Dann et al. (2001); Waite & Harrison (2002).
The Internet is still mostly an interpersonal, non-profit exchange that provides the same communication opportunities to companies of all sizes	Dann et al. (2001).
Ability to target specific markets and individuals	Educational Media Australia (2001); McDonald & Wilson (1999), in Chaffey et al. (2003); Ju-Pak (1999), in Dann et al. (2001); Foley et al. (1997), in Chaffey et al. (2003).
Source of data for research purposes	Chaffey et al. (2003).
Has the ability to combine marketing elements (product, price, service, place, and distribution) in the one location	Chaffey et al. (2003); Constantinides (2003).
Improves efficiency (FAQ's reduce telephone enquiries)	Brady (1997).
A promotional tool in the marketing mix or actually a part of the marketing mix	Dann et al. (2001); Constantinides (2003).
A move away from mass communication to communication on an individual basis	Dann et al. (2001); Chaffey et al. (2003).
Customer service improvements	Chaffey et al. (2003); McDonald & Wilson (1999), in Chaffey et al. (2003); Schubert & Selz (1999).

The Role of the Internet

According to Dann et al., the Internet can offer a sense of community by presenting opportunities to interact with others, (Dann et al. 2001), and as a form of entertainment (Lewis & Lewis 1997, in Chaffey et al. 2003).

Dann et al. also highlight its value to individuals engaged in work, education or business 'For them, the Internet needs to be a functional tool, rather than a pleasurable experience or pleasant community' (Dann et al. 2001:90-92).

It could be argued that the true value of the Internet lies in its ability to provide product-related information rather than as a form of interaction for its own sake (Raman & Leckenby 1998, in Dann et al. 2001:253). Indeed, literature on the development

and application of web sites tend to focus heavily on the 'acquisition of site visitors, converting them to a required action on the site and then retaining [them].' (Chaffey et al. 2003:33).

However, online sales and branding of the organisation are not the only roles that a web site can fulfill:

Next to this *generic* mission the Web site can be assigned a mix of commercial objectives - but often also non-profit ones like personnel recruitment, shareholders info etc. - and tasks, depending on the previously defined strategic role (Constantinides 2003:6).

Whatever the purpose of the web site, the appearance, structure and ease of use will influence the user's perception of the interactive experience and also the image of the organisation hosting it.

Therefore a high quality, well-designed site is essential to achieving site objectives, whatever they may be. Kim et al. provide a cautionary note on poorly designed sites:

...a poorly-constructed Web site can lead to lost revenues from non-realized transactions (Zona Research, Inc., 2000) and a negative affect on corporate image. Poor site design may mitigate any gains in efficiency, image, or market reach (Kim et al. 2003:1).

Purpose of a University Web Site

The advantages of an online presence outlined thus far have focused on commercial organisations. However, it is important to further consider the potential value of an Internet presence to higher education organisations.

Before doing so, it is necessary to identify the characteristics that differentiate universities from purely commercial organisations. In general, universities:

- Manage and distribute knowledge by providing a large source of high quality, in-depth information (Brody 1999; Corby & Sowards 2000);
- Have a strong focus on identifying and satisfying existing information needs (Corby & Sowards 2000);
- Have a charter that requires the provision of benefits to the public (Block 2002), usually including free services of some kind (Corby & Sowards 2000);
- Have limited commercial interests involving mostly online/distance learning activities, production of teaching notes, teaching aids, research output, and other collaborative efforts with industry and government (Brody 1999);
- Are publicly funded, requiring an obligation to disclose financial sources, particularly for research activities (Victoria University 2002);
- Avoid aggressive strategies to increase sales (Corby & Sowards 2000);
- Are restricted in the means employed to solicit revenue (Corby & Sowards 2000);
- Can be bound by the requirements of equity and social justice (Victoria University 2002); and
- Are generally accepted as being the vanguard of good community practice.

For these reasons, the focus on generating revenue is less intense than in a purely commercial enterprise. On that basis, the following roles of university web sites have been identified:

- **Sharing information** - sharing of research through repositories, as a means to facilitate collaboration, and as a cost-effective method of publication (Crow 2002).
- **Building awareness and company identity** (Brody 1999; Business Wire 2002; Crow 2002;

Constantinides 2003; Brady 1997; Sweeney 2000; Alexander 1999);

- **Supporting existing customers** (Alexander 1999; Dann et al. 2001; Sweeney 2000; Vignette Corporation 2004);
- **Building and retaining positive relationships with others** (Constantinides 2003; Dann et al. 2001; NOIE 2002; Vignette Corporation 2004);
- **Providing specific product or corporate information** (Alexander 1999, Constantinides 2003; Sweeney 2000; Vignette Corporation 2004); and

Of these web site functions, *Sharing Information* is the most dissimilar to commercial sites and may provide the most promising opportunity to build a positive image of the university while also enhancing learning opportunities to those who access the web site. By promoting itself as a leading researcher via repositories of information, a university is likely to encourage enrolments, new funding and collaboration partnerships, and to reaffirm existing relationships.

Web Site User Needs

Attempting to identify the needs of web site users can be a complicated task, as Schneiderman points out 'Designing for experienced frequent users is difficult enough, but designing for a broad audience of unskilled users is a far greater challenge' (Schneiderman 2000, in Bentley et al. 2003:2).

Identification of user needs can include limitations of the users themselves, such as the technological expertise possessed (Cunliffe 2000), appropriate level and type of language used (Schneiderman 1997), and any cultural requirements (Basu 2003). Users of commercial sites are not confined to those engaged in purchasing decisions but can also include the following (Basu 2003):

- Prospective employees
- Investors
- Supply chain partners
- The media
- The company's own employees

In a review of a single university web site, Ker Walsh Communications (1999) derived a list of site users as did The National Office for the Information Economy which established a similar list of e-commerce users in the Australian education sector (NOIE 2002). Users identified in both studies include:

- Prospective students
- Current students
- Graduates/Alumni
- Academics/staff
- Industry representatives
- Media
- Government representatives
- General public

- Suppliers

The list of users of commercial sites and those in the education sector are similar, with the exception of investors.

Early studies in web site user behaviour were based on demographics. However the focus has shifted to studying the motivations behind web site usage (Bartell Sheehan 2002). Recent research suggests that information search is the primary reason for visiting a web site (Schneiderman 1997; Bartell Sheehan 2002; Marchionini 1995, Smith et al. 1997, in Cunliffe 2000; Ody 2000, in Cox & Dale 2002; Waite & Harrison 2002; Kim et al. 2003). Other motivations include:

- Shopping (Rogers & Sheldon 1999, in Bartell Sheehan 2002; Ody 2000, in Cox & Dale 2002; Waite & Harrison 2002);
- Social aspects / interaction / communication (Bartell Sheehan 2002);
- Entertainment (Bartell Sheehan 2002);
- News information (Bartell Sheehan 2002); and
- Surfing / open-ended browsing (Schneiderman 1997; Bartell Sheehan 2002);

Clearly, information search plays a dominant role in web site usage, and the online search experience can be enhanced or inhibited by the degree of control that the user has over the flow of information, and also their impressions of the web site itself. If information is easy and convenient to

access, consumer search costs will be reduced (Waite & Harrison 2002), and the user will be more satisfied with the search experience. When information search is applied in a higher education context, the value of maintaining an online presence is apparent:

Students shopping for the right college in today's digital world overwhelmingly prefer to look to the Web first for information. A recent study performed by Lipman Hearne found that students surf early and often, as nearly 80 percent of students start trolling the Web in search of college information by the 10th grade (Vignette Corporation 2004:2).

Indeed, user satisfaction, above all, will determine whether a web site will meet its strategic objectives (Cox & Dale 2002; Kim et al. 2003; Basu 2003; Cox & Dale 2002; Bentley et al. 2003). Forester Research (in Cunliffe 2000), estimate that:

...poor Web design will result in a loss of 50 per cent of potential sales due to users being unable to find what they want, and a loss of 40 per cent of potential repeat visits due to an initial negative experience (Forrester Research 1994, in Cunliffe 2000:297).

Determinants of High Quality Web Sites

Table 2 provides a summary of factors that have been identified as broad determinants of a high quality web site

Table 2

Determinants of High Quality Web Sites

Determinants	Source
Content	Corby & Sowards (2000); Kim et al. (2003); Brajinik (2001), in Kim et al. (2003); Joseph et al. (1999), in Waite & Harrison (2002); Jun et al. (2001), in Waite & Harrison (2002); Schubert & Selz (1999); Basu (2003).
Ease of use	Cox & Dale (2002); Kim et al. (2003); Basu (2003); Schubert & Selz (1999); Jun et al. (2001), in Waite & Harrison (2002); Constantinidis (2003).
Appearance	Corby & Sowards (2000); Cunliffe (2000); Kim et al. (2003); Basu (2003); Brajinik (2001), in Kim et al. (2003).
Navigation	Kim et al. (2003); Joseph et al. (1999), in Waite & Harrison (2002); Brajinik (2001), in Kim et al. (2003); Basu (2003).
Performance	Corby & Sowards (2000); Joseph et al. (1999), in Waite & Harrison (2002); Jun et al. (2001), in Waite & Harrison (2002).
Speed	Corby & Sowards (2000); Cunliffe (2000); Waite & Harrison (2002).
Accessibility	Joseph et al. (1999), in Waite & Harrison (2002); Jun et al. (2001), in Waite & Harrison (2002); Basu (2003).
Logical structure	Kim et al. (2003); Basu (2003).
Consistency	Joseph et al. (1999), in Waite & Harrison (2002); Basu (2003).
Users skill level accommodated	Basu (2003); Constantinidis (2003).
Customization	Joseph et al. (1999), in Waite & Harrison (2002).
Online/offline support	Basu (2003).
Complaints mechanism	Joseph et al. (1999), in Waite & Harrison (2002).
Site mission	Corby & Sowards (2000).
Diverse functions	Jun et al. (2001), in Waite & Harrison (2002).
Relationship services	Cox & Dale (2002).
Corporate credibility	Kim et al. (2003).
Business function	Kim et al. (2003).
Online resources	Cox & Dale (2002).

While there is general agreement in the literature on the broad determinants for a high quality site, attempts to reduce them into a one size fits all model has resulted in a myriad of variations on essentially the same material. However three core categories emerge:

- Design features, most of which assist with navigation of the site (Page Design);
- Style aspects of the site that encompass colour, font type, and graphics (Site Style); and

- Content aspects that include information quality, quantity, depth, and accuracy (Content).

Essential Design Elements

Tables 3-1, 3-2 and 3-3 provide a summary of specific page design elements that are considered essential for a high quality web site. Table 3-4 provides details of site style elements that are also considered essential for a high quality web site

Table 3-1

Page Design Elements for High Quality Web Sites (General Aspects)

Web Site Component	References
Page Design – General Aspects	
Pages should load quickly (taking into account capabilities of users equipment).	Flanders and Willis (1996); Cox & Dale (2002); Schubert & Selz (1999) Cunliffe (2000); Waite & Harrison (2002).
Avoid clutter and overcrowding of information on pages.	Flanders and Willis (1996); D’Angelo & Little (1998); Corby & Sowards (2000); Bentley et al. (2003).
Keep site design consistent	(Sweeney (2000); Cox & Dale (2002); D’Angelo & Little (1998); Basu (2003).
Site should be easy to read	Sweeney (2000); Flanders & Willis (1996).
Include download links for any special software required to operate the site	Chak (2002).
Include details of browser type and version required to use the site	Alexander (1999); Chak (2002).
Ensure there is a print friendly version of site pages available	Sweeney (2000).
Ensure the URL is included when a web page is printed	Alexander (1999); D’Angelo & Little (1998).
Ensure layout of pages is consistent on each page	Sweeney (2000).
Design for various screen widths	Sweeney (2000).

Table 3-2

Page Design Elements for High Quality Web Sites (Navigation Aspects)

Web Site Component	References
Page Design – Navigation Aspects	
Site should be easy to navigate	Sweeney (2000); Cox & Dale (2002); D'Angelo & Little (1998); Basu (2003); Schubert & Selz (1999); Corby & Sowards (2000).
<i>Include an effective search engine</i>	Sweeney (2000); Alexander (1999); Chaffey et al. (2003); Chak (2002); Flanders & Willis (1996); Cox & Dale (2002); D'Angelo & Little (1998); Basu (2003); Waite & Harrison (2002).
Provide user friendly site maps	Sweeney (2000); Alexander (1999); Cox & Dale (2002); Basu (2003); Schneiderman (1997).
Minimise the number of links to reach desired information	Chaffey et al. (2003).
Use vertical rather than horizontal navigation bars as they are easier to read	Chak (2002).
Place the navigation bar in the same location on each page	Sweeney (2000); Cox & Dale (2002).
Include a help function to explain how to navigate the site	Chak (2002).
Include a browser title	Alexander (1999).
Include page titles to orientate the site visitor	Sweeney (2000); Alexander (1999).
Ensure flexibility for users to navigate from anywhere in the site.	Chak (2002).
Limit the number of choices within each menu to less than seven	Chaffey et al. (2003); Schneiderman (1997).
Limit scrolling down the page to a maximum of two scrolls	Flanders & Willis (1996).
Don't use frames. They create difficulties for search engines and indexing of pages.	Sweeney (2000).
Include contact information on every page	Sweeney (2000).
Home page should indicate who the owner is, what is inside and how to contact them.	Gleisser (2001), in Chaffey et al. (2003); Chak (2002).
Include a what's new section on the first page	Sweeney (2000).

Table 3-3

Page Design Elements for High Quality Web Sites (Links Aspects)

Web Site Component	References
Page Design – Links Aspects	
Avoid having dead-end links by updating regularly	Sweeney (2000); D’Angelo & Little (1998).
Use default colors for links where blue represents an unvisited link and purple represents a visited link.	Sweeney (2000).
Include a text version of the links on the bottom of the page	Sweeney (2000); Flanders & Willis (1996).
Ensure each page has links to the homepage, and site map.	Alexander (1999); Cox & Dale (2002).
Avoid ‘under construction’ pages	Sweeney (2000).
Place links to other sites at least three layers down in the site to avoid users leaving too early	Sweeney (2000).
Pages not found should have instructions on how to rectify the problem and provide a link back to the home page. Do not use the term <i>Error Page</i>	Chak (2002).

Table 3-4

Site Style Elements for High Quality Web Sites

Web Site Component	References
Site Style	
General	
Ensure online and offline corporate image is consistent	Sweeney (2000); Flanders & Willis (1996).
Home page should have the same role as a magazine cover and attract users to go further into the site	Flanders & Willis (1996); Brady (1997); Educational Media Australia (2001).
Colours	
A light background with dark text is easiest on the eyes. Find an appropriate balance of colours	Sweeney (2000); Flanders & Willis (1996); D'Angelo & Little (1998).
Text	
Don't set text size too small	Sweeney (2000).
Use the same, easy to read font, throughout the site	Flanders & Willis (1996); D'Angelo & Little (1998).
Keep text brief by using bullet lists, headers & horizontal rules to create visual breaks	Sweeney (2000).
Graphics	
Use graphics for some links	Flanders & Willis (1996).
Ensure graphics and pictures are of a high quality	Flanders & Willis (1996); Brady et al. (1997); Jupak (1999) in Dann et al. (2001).
Ensure a balance between graphics and text	Flanders & Willis (1996); D'Angelo & Little (1998).
Ensure each page is no larger than 50k including graphics	Sweeney (2000).
Use thumbnail graphics where possible	Sweeney (2000).
Ensure graphics are as small as possible without compromising the visual strategy	Brady et al. (1997).
Ensure graphics have text labels to allow efficient search function & text only browsing	Sweeney (2000); Flanders & Willis (1996).
Avoid splash pages – can be annoying and are not useful to search engines	Sweeney (2000); Chak (2002).
Provide an option for users to view a text only version of the site or with full graphics displayed.	Alexander (1999); Schneiderman (1997).
Curb the use of image maps. Break larger image Maps into smaller sections that load quickly	Sweeney (2000).

The requirement for a high quality web site is no less compelling for universities that it is for purely commercial organisations, as Corby and Sowards point out:

The pool of university donors, funding supporters, and enrollment prospects increasingly overlaps with the pool of Internet users who do their shopping online. To be visible, useful, and valued, educational pages will have to meet those rising expectations (Corby & Sowards 2000:47).

Web Site Evaluation in the Education Sector

Research specifically dealing with web sites of education organisations is not well represented in the literature. A review of the literature reveals the

following passing references to the quality of university web sites:

- College web sites lack consistency due to the ad hoc creation of sites and pages from within different departments (Vignette Corporation 2004);
- University web sites can be less visually appealing than commercial sites (Brody 1999); and
- Overdone complex graphics are less evident in .edu sites (Corby & Sowards 2000).

The disparate comments tend to suggest that university web sites may share common design characteristics (for example, being less visually appealing or less graphic intensive than commercial

sites). However, there is insufficient information to draw firm conclusions about university web site quality.

At this point, it would be useful to consult directly with university web site users regarding design features that they believe provide a high quality online experience.

Study of University Web Site Users

The aim of this study was to identify common underlying dimensions (Waite & Harrison 2002) that university web site users consider important for a high quality site. The second aim was to determine whether these dimensions differed from the essential design elements for a high quality commercial site, as outlined in the literature review. This will assist universities to develop and maintain high quality web sites that will effectively meet the needs of site users.

Methodology

Two groups of university web site users were selected to undertake an assessment of a university site well known to them. User groups were selected from the list of users identified earlier in the literature review. The two groups consisted of:

- 21 graduate students at Victoria University undertaking the subject BHO5501 Electronic Marketing, and
- 11 teaching and 7 support staff representing 67% of the full-time staff from the School of Hospitality, Tourism and Marketing (HTM), a department within Victoria University.

The groups were selected on the basis of their easy accessibility and intimate knowledge of a university web site, thus forming a convenience sample from a single location. User familiarity with web sites under assessment was considered an advantage in a study by Schubert & Selz, as they represented a

‘small sample of high qualified user opinions’ (Schubert & Selz 1999:7).

Similarly, staff at the School of HTM are intimately familiar with the School’s web site as both users and developers of content for the site.

Both groups were experienced Internet users but were not professional developers. Therefore, although the sample is small, the study participants are well qualified as users. The precedence for using students to evaluate web sites is well established by (Kim et al 2003); (Waite & Harrison 2002); (D’Angelo & Little 1998); and (Crow 2002), and are considered an appropriate choice for this study as they represent a large proportion of the university’s target market.

The two groups were asked to evaluate their respective web sites (The Victoria University site for student participants and School of HTM for staff participants) and comment on ways that the site could be improved. Attention was to be paid to technical aspects such as navigation and ease of use, and also to visual aspects such as graphics and layout. Any other aspect requiring improvement could also be included. Participants were required to provide their comments in writing and were given approximately three weeks to do so.

The aim in selecting this methodology was to obtain maximum commitment and interest from study participants, and also to allow the opportunity of providing new ideas that have not been influenced by a set of pre-determined criteria, as would have occurred with a forced response questionnaire.

Results and Discussion

Table 4 summarises the web site design elements mentioned most frequently by staff and students. Table 4 shows that both groups of study participants (students and staff) are similar in their views on page design elements and that these are consistent with the elements listed in Tables 3-1 to 3-4 in the literature review.

Table 4

Comparison of Student and Staff Comments

	Student Comments	HTM Staff Comments
General	Download speed 33% Cluttered pages & overload 30%	Comments too few to process.
Navigation	Search engine 30% Too many clicks 21%	Search engine & site maps 42%
Links	Links need updating 26%	Links need updating 50%
Colours	Positive comments 41% Negative comments 35%	More colour 100%
Graphics	More graphics 67% Less or same graphics 6% Poor quality graphics 22%	More graphics 75% Less or same graphics 25%
Text	Font size is too small 57% Font size is acceptable 28%	Comments too few to process.

The following section uses direct quotes from study participants to provide insights into each of the characteristics identified.

General Aspects of Page Design

Many of the comments in this section indicated that the home page was too cluttered with information (30%). As one respondent has suggested '...the front page of the VU Website gives overload information in one page, trying to fit as much as possible' (student 1). This view is reinforced by the comment '...as the home page has too much clutter one tends to get a little confused about what information one is looking for and exactly where to find it' (student 6).

The information overload problem appears to lie in the amount of words used 'With regard to layout and design there is too much information on the home page. Though it is fairly neat, it still looks cluttered due to the amount of words' (student 9).

Download speed was mentioned by 31% of students with positive comments such as 'The performance of this site is quite good particularly download speed. It takes only a few seconds' (student 4), and 'The web site seems to get uploaded fast' (student 6).

More specific comments are offered regarding movement between pages such as 'The speed of loading a new page is good because there are not many pictures and animations which can slow down the loading of the page' (student 5), and 'The speed is quite fast when connecting to other pages' (student 1).

Navigation Aspects of Page Design

Navigation aspects of page design were an area of concern for the majority of student participants (86%), with most comments relating to search engine difficulties (33%) including '...[the] VU

Website is quite difficult to search unless you spend more time with patience' (student 1), and '...finding some issues such as staff telephone numbers and cover sheets for assignments are complicated to search' (student 8).

One respondent offered a detailed example of search engine problems:

In terms of using the search link, this is certainly a weak aspect of the VU website. Whilst the user can select from a variety of catalogues to refine the search, the entering of "timetable" as a search word returned over 200 entries, with none of the first entries listed being a timetable for any faculty (student 10).

A large proportion of students believed that there were too many clicks required to reach the desired information (21%). For example, 'There are too many links [clicks] with little information and it is not easy to find information you need. Especially information related to international students' (student 1), and 'I clicked more than 15 times and took more than five minutes to locate it [assignment cover sheet]' (student 9).

A comment was also offered on the importance of planning when designing web site links 'The links need to be planned well; instead of making too many internal links the particular link should take the browser to the desired page' (student 7).

Links Aspects of Page Design

Only a few comments were made in this section, mainly relating to the updating of links (33%), and an absence of default colours to indicate when a link has already been viewed (25%), as illustrated by the comment '...does not indicate which topics...have been viewed already and the ones which have not...For example, in a "google" search, the ones which have been viewed, are seen in a different colour' (student 5).

Colour Aspects of Site Style

Comments on colour choices for the style of the site were evenly distributed between favourable (44%) and unfavourable (39%). Favourable comments included '...simple fonts and colours are most suitable' (student 10), and 'The choice of these colours, are pleasing to my eyes, especially with the background being in white' (student 9).

Examples of negative perceptions can best be illustrated by the comment 'Colours are too monotone and cold and make the site look old fashioned' (student 16). The importance of consistency in web site design when referring to colour combinations was also evident 'The colour combination of the home page. It goes well with the university logo. But it is not standard throughout the website' (student 7).

Graphics Aspects of Site Style

A large proportion of the respondents suggested an increase in the use of graphics (67%) with 22% indicating that the quality of current graphics was poor. Conversely, 6% suggested that fewer graphics are required. Those in favour of more graphics suggested that '...the graphics are not as standard as most websites and only a few are presented on this site. Therefore, it requires more graphics in order to attract more users towards it' (student 21).

In terms of the ways that graphics could be employed on the web site, one suggestion was that

...the home page should contain some pictures about the University campus and some colorful pictures of students that can have a positive impact for those who are first time visitors and especially for the international students who want to collect some information about the University (student 14).

Those in favour of limited use of graphics suggested that '...the web site content should contain more of the text than the images' (student 7), and that '...the speed of loading a new page is good because there are not many pictures and animations which can slow down the loading of the page' (student 5).

Text Aspects of Site Style

Over half of the students (57%) believed that the text size was too small with comments such as 'The text size is too small and difficult to read' (student 15), and 'The font size is also too small and therefore difficult to read' (student 12).

Web site design elements mentioned by students are consistent with those outlined in Tables 3-1 to 4 of the literature review, with the exception of the following:

- Include a browser back button,
- Include drop down menus on the home page, and

- Take into account different languages and cultures on the site.

In addition, students repeatedly referred to colour and graphics usage in the web sites examined. This suggests that students place greater emphasis on these elements.

The most frequently occurring comments by staff relate to:

- Improved search tools, and
- Keeping links updated.

These are consistent with student comments and with the essential design elements for a high quality commercial web site listed in Tables 3-1 to 4.

The purpose of this study was to determine whether design elements for a high quality, commercial web site could be applied to the quality of university sites. After examining the comments of users of two university web sites, it appears that there are no major differences between the elements that university site users consider important and those that are considered essential for a high quality commercial web site.

Interestingly, the cluttered pages, information overload, and text-related aspects highlighted by both user groups are consistent with the findings of a study of small business web sites undertaken by Bentley et al. (2003). Users in this study indicated that '...many sites contain too much irrelevant information'. In addition they placed importance on 'how text is organised', and also 'the display and size of the text' (Bentley et al. 2003, p. 1).

Notwithstanding the similarity between the comments of university user groups and the essential design criteria established in existing literature, there does appear to be a different emphasis placed on graphics and colour usage. By far, the majority of users would prefer to see more graphics on both university sites (65% of students and 75% of staff).

Summary and Conclusions

This study has compared essential design elements necessary for a high quality, commercial web site with the needs of university web site users. All design elements identified by respondents as important in university web sites were consistent with those identified in the literature for commercial websites.

The study also identified areas where university web sites were found wanting. These areas include information overload, cluttered pages, search engine problems, and too many clicks to reach information.

Clearly, a user friendly web site is important to ensure users are satisfied with their online experience. Moreover, an understanding of the various roles that a web site can perform, such as presenting a professional image, supporting existing customers and the sharing of research information will allow universities to fully utilise the benefits of

developing and maintaining an online presence while continuing to retain their traditional role as knowledge managers.

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